VEHICLE SEATING WITH FOOT REST

BACKGROUND OF THE INVENTION

[0001] This invention relates generally to vehicle seating and more particularly to a tourist/coach class aircraft seating arrangement. Aircraft seating is typically divided into various classes, for example first class, business class, and coach or tourist class. For each class of seating, an individual passenger is allotted a preselected amount of space (both area and volume). First-class seats provide the most individual space, and also may include features to improve comfort, such as fully reclining sleeper functions. In contrast, the tourist/coach class is provided with a relatively small amount of space, in order to provide the most efficient transportation and lowest cost. However, this space limitation can produce passenger discomfort or possibly even physical ailments, and also makes it difficult for a passenger to find a comfortable position in which to sleep on long flights.

[0002] To alleviate discomfort, it is advantageous for a passenger to be able to support his or her feet raised above the floor of the aircraft. This not only provides a better sitting posture but also enables the passenger to keep his or her feet out of contact with the floor, which may be relatively dirty and cold. Unfortunately, prior art coach class seats do not readily accommodate a foot support. Furthermore, the space in front of a seated passenger is typically left clear in order to store luggage or various carry-on items.

BRIEF SUMMARY OF THE INVENTION

[0003] Therefore, it is an object of the invention to provide a footrest for a passenger seat which supports a passenger's feet above the floor of a vehicle.

[0004] It is another object of the invention to provide a footrest which supports a passenger's feet in different longitudinal positions.

[0005] These and other objects of the present invention are achieved in the preferred embodiments disclosed below by providing a passenger seating arrangement for a vehicle, including: a frame for being attached to a floor of a vehicle; an upwardly-extending seat back carried by the frame; a seat bottom carried by the frame for supporting a passenger;

and a footrest disposed forward of the seat bottom. The footrest has a foot supporting surface positioned above the floor.

[0006] According to another embodiment of the invention, the footrest includes: an enclosure having a front wall, opposed top and bottom walls, opposed side walls, and a rear opening, the enclosure defining a surface for support a passenger's foot; and means for suspending the enclosure underneath a second seat positioned forward of the seat.

[0007] According to another embodiment of the invention, a drawstring is disposed around the periphery of the rear opening.

[0008] According to another embodiment of the invention, the top wall of the footrest is attached underneath a bottom of the second seat by a plurality of fasteners.

[0009] According to another embodiment of the invention, a footrest assembly for a passenger seat which is mounted to a floor includes: an enclosure having a front wall, opposed top and bottom walls, opposed side walls, and a rear opening, the enclosure defining a surface for support a passenger's foot; and means for supporting the enclosure above the floor.

[0010] According to another embodiment of the invention, the footrest is suspended underneath a second seat positioned forward of the seat.

[0011] According to another embodiment of the invention, a drawstring is disposed around the periphery of the rear opening.

[0012] According to another embodiment of the invention, the top wall of the footrest is attached underneath a bottom of the second seat by a plurality of fasteners.

[0013] According to another embodiment of the invention, a passenger seating arrangement for vehicle includes: a frame for being attached to a floor of a vehicle; a seat bottom disposed on the frame for supporting a passenger; and a footrest disposed forward of the seat bottom for supporting the feet of a passenger above the floor with each foot in a different longitudinal position relative to the seat bottom.

[0014] According to another embodiment of the invention, the footrest includes: a first block for supporting a first foot of the passenger, the first block mounted for longitudinal

translation relative to the seat; and a second block for supporting a second foot of the passenger, the second block mounted for longitudinal translation relative to the seat.

[0015] According to another embodiment of the invention, the first and second blocks are interconnected such that forward longitudinal movement of one block causes reward longitudinal movement of the other block.

[0016] According to another embodiment of the invention, each block includes a non-slip surface thereon.

[0017] According to another embodiment of the invention, the blocks are carried by a pair of spaced-apart rails, the rails being pivotally attached to the floor and moveable between: an upwardly-extending stowed position; and a use position wherein the rails extend along the floor.

[0018] According to another embodiment of the invention, the footrest includes a generally laterally extending foot bar disposed in a position relative to the seat for supporting first and second feet of a passenger seated in the seat above the floor, the foot bar being pivotable so as to support the first and second feet of the passenger in different longitudinal positions relative to the seat.

[0019] According to another embodiment of the invention, the passenger seating arrangement of further includes means for means for preventing the foot bar from pivoting once it is set in a desired position.

[0020] According to another embodiment of the invention, the foot bar includes a non-slip surface thereon.

[0021] According to another embodiment of the invention, a passenger seat for vehicle includes: a frame for being attached to a floor of a vehicle; a upwardly-extending seat back carried by the frame; a seat bottom carried by the frame for supporting a passenger; and a footrest assembly attached the seat. The footrest is moveable between: a stowed position; and a deployed position wherein the footrest extends rearward of the seat back for supporting the feet of a rear-seated passenger above the floor.

[0022] According to another embodiment of the invention, the footrest assembly includes: a pair of spaced-apart rails; a laterally-extending foot bar disposed extending between the rails; and a support surface disposed between the rails.

[0023] According to another embodiment of the invention, the support surface includes a grid of resilient strands.

[0024] According to another embodiment of the invention, a forward end of each of the rails is pivotally attached to the seat back.

BRIEF DESCRIPTION OF THE DRAWINGS

[0025] The subject matter that is regarded as the invention may be best understood by reference to the following description taken in conjunction with the accompanying drawing figures in which:

[0026] Figure 1 is a perspective view of a seat set including a suspended footrest;

[0027] Figure 2 is a perspective view of one of the footrests shown in Figure 2, from a rear three-quarter position;

[0028] Figure 3 is a perspective view of the footrest shown in Figure 2, from a front three-quarter position;

[0029] Figure 4 is a perspective view of the footrest of Figure 3 in a closed position;

[0030] Figure 5 is a side view of a passenger seated in a seat incorporating the footrest shown in Figure 2;

[0031] Figure 6 is a perspective view of a seat set incorporating a split footrest assembly;

[0032] Figure 7 is a side view of the seat set of Figure 6;

[0033] Figure 8 is a perspective view of a seat set incorporating a pivoting footrest assembly;

[0034] Figure 9 is a side view of the seat set of Figure 8;

[0035] Figure 10 is a side view of a seat incorporating a variation of the split footrest assembly shown in Figure 6;

[0036] Figure 11 is a side view of a seat incorporating another variation of the split footrest assembly shown in Figure 6; and

[0037] Figure 12 is a perspective view of a seating arrangement incorporating an elevated footrest.

DETAILED DESCRIPTION OF THE INVENTION

[0038] Referring to the drawings wherein identical reference numerals denote the same elements throughout the various views, Figure 1 illustrates a passenger seat set 10 incorporating a suspended foot rest. The seat set 10 includes two seats 12 and 14 which are collectively provided with three arm rests 16, 18, and 20, each shown in the lowered passenger use position. The seats include seat backs 22 and 22' and seat bottoms 24 and 24'. The seats 12 and 14 are supported by a frame 26. The frame 26 is mounted on legs 28 and 30 which are in turn mounted to the deck of the aircraft by track fittings of a known type. For illustrative purposes, the suspended foot rest is only described in detail with respect to the seat 14, however it will be understood that the same type of seat bottom may also be implemented on the other seat 12.

[0039] A bag-type suspended footrest 32 is suspended under the seat 14. The suspended footrest 32 is illustrated in detail in Figures 2-4. It is constructed of a natural or synthetic fabric and includes spaced-apart top and bottom walls 34 and 36, spaced-apart side walls 38 and 40, a front wall 42, and a rear opening 44. The rear opening 44 may include a drawstring 46 disposed around its periphery. The rear opening 44 could also be elasticized so that it tends to close around a passenger's feet. The footrest 32 may be padded or insulated in a known manner and may include a soft inner liner 45 if desired. The footrest could also be constructed of a rigid material. The footrest 32 is attached to the underside of the seat bottom 24'. In the illustrated example, the footrest 32 is attached by a plurality of rivets 48, however any know type of fastener or structure which securely holds the footrest 32 to the seat bottom 24' may be used.

[0040] Figure 5 depicts the footrest 32 in use by a passenger "P". The passenger P is seated in a seat 50, which may be similar to the seat 14, aft of the seat 14. The passenger's feet are inserted into the footrest 32 through the rear opening 44 where they are comfortably suspended above the deck "D" of the aircraft by the bottom wall 36, which forms a foot-supporting surface. If desired, the drawstring 46 may be pulled tight to close the rear opening 44 about the passenger's feet. In this position, the passenger's feet do not touch the relatively hard floor which may also be cold or dirty. This allows the passenger to remove his or her shoes without getting cold feet or soiling his or her socks. The passenger's feet are also suspended out of the way of any carry-on luggage that might be placed under the seat 14.

[0041] Figures 6 and 7 illustrate a passenger seat unit 110 having seats 112 and 114 which incorporates a split footrest assembly 116. The split footrest assembly 116 includes a left footrest 118 and a right footrest 120 for each individual passenger seat. Each of the left and right footrests 118 and 120 includes a block 122 constructed and shaped in an appropriate manner for supporting a passenger's foot. For example, the block 122 may have a tapered top foot-supporting surface of a synthetic rubber or other resilient material with a tread pattern to prevent the passenger's foot from slipping. Each block 122 is mounted on a longitudinally-extending track 124 and may be slid forward or backwards to a desired position. Although not shown, each of the left and right footrests 118 and 120 may include a locking means for preventing the block 122 from moving once it is set in a desired position. The motion of the left and right footrests 118 and 120 could also be coordinated, through mechanical interconnection or otherwise, such that forward motion of the right footrest 120 causes a proportional backwards motion of the left footrest 118 and vice-versa. The split footrest assembly 116 allows the passenger's feet to be comfortably supported in different longitudinal positions. Figures 5 and 6 depict the legs "L" of a passenger sitting in such a position, with the knees bent to different degrees.

[0042] Figures 10 and 11 illustrate variations of the split footrest assembly 116. Referring to Figure 10, a split footrest assembly 116' is substantially similar in construction and operation to the split footrest assembly 116 described above, and includes moveable footrest blocks 122' (only one of which is shown in Figure 10). In this variation, the tracks 124' (only one shown) that the blocks 122' ride in are not fixed, but rather are pivotally

mounted at a rear end thereof so they can be moved between a horizontal use position "A" and an upright storage position "B" underneath the passenger's seat . In the storage position the tracks 124' do not interfere with the passenger's feet.

[0043] Figure 11 illustrates another split footrest assembly 116" which is substantially similar to the split footrest assembly 116', except that the tracks 124" in which the blocks 122" ride are pivotally mounted at a front end thereof so they can be moved between a horizontal use position "E" and an upright storage position "F" underneath a seat. In this variation, the split footrest assembly 116" is intended for the use of a passenger seated in a seat behind the seat to which the split footrest assembly 116" is mounted .

[0044] Figures 8 and 9 illustrate a seat set 210' having seats 212 and 214 and including a pivoting footrest assembly 216. The pivoting footrest assembly 216 comprises a laterally-extending foot bar 218 for each individual passenger seat 212 and 214. The foot bar 218 may be supported by a mount 220 which is attached to a passenger seat located forward of the seat 212. The foot bar 218 is constructed and shaped in an appropriate manner for supporting a passenger's foot. For example, the foot bar 218 may have a tapered top foot-supporting surface of a synthetic rubber or other resilient material with a tread pattern to prevent the passenger's foot from slipping. The foot bar 218 is pivotable about the axis of the mount 220. Although not shown, the foot bar 218 may include a locking means for preventing it from moving once it is set in a desired position. The pivoting footrest assembly 216 allows the passenger's feet to be comfortably supported in different longitudinal positions Figures 7 and 8 depict the legs "L" of a passenger sitting in such a position, with the knees bent to different degrees.

[0045] Figure 12 illustrates a passenger seating arrangement incorporating an elevated foot rest. The seating arrangement includes two rows 312 and 314 each having two seats 316, 318, 320, and 324, respectively. For the purposes of illustration the elevated footrest assembly will only be described in detail with respect to the seats 318 and 324, however it will be understood that the same type of footrest assembly may also be implemented on the other seats 316 and 320, and that the same type of footrest assembly may be implemented on any number of seats, seat units, or rows of seats. The seats 318 and 324

include seat backs 326 and 326' and seat bottoms 328 and 328'. The seats 12 and 14 are supported by a which is mounted on legs 330, 330', 332', and 332', which are in turn mounted to the deck of the aircraft by track fittings of a known type.

[0046] An elevated footrest assembly 334 and 334' is carried by the seats 318 and 324, respectively. The elevated footrest assemblies 334 and 334' are substantially identical in construction, accordingly, only the footrest assembly 334 will be described in detail. The footrest assembly 334 comprises spaced-apart side rails 336 and 338, a transverse foot bar 340, and a support surface 342 disposed between the side rails. The entire footrest assembly 334 is pivotally mounted to the seat 318 , for example with hinges 344, so that it may be moved between a stowed position against the seat back 326, and a deployed position wherein it extends rearward from the seat back 326. In the illustrated example the support surface 342 is a hammock-like grid of resilient strands such as elastic cords or metallic wires. The support surface could also be made from a continuous material such as plastic sheeting or natural or synthetic fabric.

[0047] Figure 12 depicts the footrest assembly 334 in use. A seated passenger "P" can place brace his or her feet against the foot bar 340, with his or her heels on top of the support surface 342. This allows the passenger P to raise his or her feet from the vehicle floor, which may be relatively cold or dirty. Because of the resilient nature of the support surface 342, the footrest assembly 334 allows the passenger to sit in a rolled or "side sleep" position with each foot at a different height.

[0048] Depending on how it is mounted, the footrest assembly 342 may also allow the passenger P to sit in a "knees up" position with his or her knees bent. This provides an alternative posture so that the passenger P can vary his or her knee and leg position throughout a flight. The degree to which a passenger's knees are bent when placed on the footrest assembly 334 will vary depending upon the passenger's height and leg length, and the longitudinal spacing or "pitch" between the seat rows. In general, if the footrest assembly 334 is mounted at or above the bottom surface of the seat bottom, it will tend to support the passenger's thighs and knees above a horizontal plane so long as the passenger is equal to or taller than a 50th percentile adult male. If desired, means for adjusting the height of the footrest assembly 334 may be provided to accommodate a "knees up" position in passengers of different statures. It is noted that the described

structure is only an example of how a passenger's feet may be supported in such a "knees up" position, and other configurations may be substituted so long as they extend rearward from the seat 318 so as to support the passenger's feet above the floor.

[0049] The foregoing has described a seating arrangement including various footrest assemblies. These seat features may be combined with each other as desired to produce a seat having multiple comfort features. While specific embodiments of the present invention have been described, it will be apparent to those skilled in the art that various modifications thereto can be made without departing from the spirit and scope of the invention. Accordingly, the foregoing description of the preferred embodiment of the invention and the best mode for practicing the invention are provided for the purpose of illustration only and not for the purpose of limitation, the invention being defined by the claims.